

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 10/583,701 Confirmation No. 3249
Applicants : JEONG-BONG YOON et al.
Filed : June 20, 2006
Title : Bake-Hardenable Cold Rolled Steel Sheet Having
Excellent Formability, and Method of Manufacturing the
Same
Group Art Unit : 1793
Examiner : Deborah Yee
Customer No. : 28289

MAIL STOP AMENDMENT
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

DECLARATION OF
UNDER 37 C.F.R. §1.132

I, Jeong-Bong Yoon hereby declare as follows:

1. I am a joint inventor of the invention described and claimed in the above-captioned application.
2. I was awarded my master degree in the year 1982 from Korea University.
3. From 1982 until 2008, I worked for POSCO as a researcher
4. I have a patent (US 6773518 B2, filed on June 5, 2001, Cold rolled steel sheet having excellent corrosion resistance to sulfuric acid).
5. As a joint inventor of the invention described and claimed in the above-captioned application, I am fully familiar with the subject matter of the invention. I am also familiar with

the teachings of the prior art references cited by the Examiner in the Office Action of September 24, 2008.

6. More specifically, International Patent Application No. WO 2003/031670 to Murakami et al. (hereinafter "the Murakami application") is directed to a steel sheet for a container having a weld. The steel sheet contains, in mass, 0.0050% or less of carbon (C), 0.0060% or less of nitrogen (N), and boron (B) such that the ratio of B/N is within a range from 0.40 to 2.00.

7. United States Patent No. 5,078,809 to Kinoshita et al. (hereinafter "the Kinoshita patent") discloses a cold-rolled steel sheet containing 0.001-0.003 wt. % C, 0.004 wt. % or less N, and 0.03-0.20 wt. % phosphorus (P), and United States Patent No. 6,709,419 to Yoshinaga et al. (hereinafter "the Yoshinaga patent") is directed to a steel sheet excellent in painting bake hardenability and is provided by the Examiner as allegedly disclosing adding small amounts of molybdenum (Mo) and chromium (Cr) to steel alloys to improve bake hardenability.

8. The Murakami application, the Kinoshita patent, and the Yoshinaga patent, either considered individually or in combination, fail to teach or suggest the production of MnS and/or CuS precipitates having an average size of $\leq 0.2 \mu\text{m}$ or less as required by each of the independent claims.

9. Regarding the Murakami application, the Examiner contends that examples P and Q provided in Table 11 on page 35 of the Murakami application teach all of the claimed elements of the present invention except that it has a higher C content and does not teach or suggest MnS and/or CuS precipitates having an average size of $\leq 0.2 \mu\text{m}$ or in the amount of 2×10^8 precipitates or more per unit area (see page 3 of the Office Action of September 24, 2008). The Examiner further contends that such properties would be expected since the composition and

process of making are closely met. However, fine precipitates having an average size of ≤ 0.2 μm are hardly obtained without controlling the Mn, Cu and S amounts to a ratio of the present invention. In a case where a ratio of Mn/S is greater than the range of the present invention, the MnS precipitates have a size greater than 0.2 μm and are reduced in number due to a fewer number of nuclei created and faster growth rate. Cu serves to further increase the number of the precipitates by nucleus creation of the CuS precipitates. Therefore the CuS precipitates are not produced without adding Cu. Moreover, Cu consumes S and accordingly hinders growth of the MnS precipitates, thereby preventing the MnS precipitates from being coarsened. On the contrary, the Murakami patent does not ensure an increase in the number of the precipitates since Cu is not added.

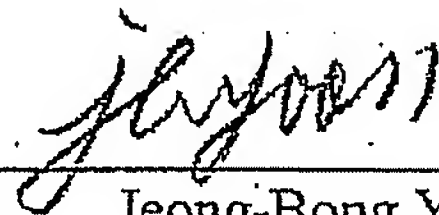
10. Regarding the combination of the Kinoshita patent and the Yoshinaga patent, the Examiner also admits that these references fail to teach or suggest MnS having an average size of ≤ 0.2 μm or in the amount of 2×10^8 precipitates or more per unit area as required by the claimed invention (see page 4 of the Office Action of September 24, 2008). The Examiner then argues that such properties would be expected since the composition and process of making are closely met. However, the fine precipitates having an average size of ≤ 0.2 μm or in the amount of 2×10^8 precipitates are hardly obtained without controlling the Mn, Cu and S amounts to a ratio of the present invention. Cu, when added, produces fine CuS precipitates, and consumes S effectively to render the MnS precipitates finer. On the contrary, the Kinoshita patent and Yoshinaga patent fail to produce fine MnS or CuS precipitates or precipitates in the amount of 2×10^8 .

11. Accordingly, it was discovered by the Applicants that a bake-hardenable cold-rolled sheet comprising the compositions set forth in independent claims 58, 59, 68, 78, 90, 99, and 109 provides the new and unexpected result of the production of MnS and/or CuS

precipitates having an average size of $\leq 0.2 \mu\text{m}$ or in the amount of 2×10^8 precipitates or more per unit area. The production of such precipitates yields a bake-hardenable cold-rolled sheet having improved bake hardenability, formability, yield strength, and yield strength-ductility balance. Controlling the size and number of precipitates leads to finer grains and higher strength. As a result, this allows for the production of a steel sheet having superior physical properties and strength as well by employing a fewer number of solution-strengthening elements such as P and Si, which are detrimental to physical properties.

12. Accordingly, the bake-hardenable cold-rolled steel sheet of claims 58, 59, 68, and 78 and the method of producing such a sheet as set forth in claims 90, 99, and 109 is not obvious in view of the Murakami application or the combination of the Kinoshita patent and the Yoshinaga patent.

13. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.



Jeong-Bong Yoon



December 23, 2008.